Amendments to the Specification

Please amend the paragraphs at page 2, lines 8-30, in the following manner:

~~Disclosure of the Invention~~

BRIEF SUMMARY ~~Problems to be solved by the Invention~~

~~Thus, one of the problems to be solved by the present invention is~~ In an aspect of this disclosure, there is provided an approach to display a desired image, for example an entire image of a contrasted blood vessel as a special three-dimensional image based on image data which is obtained in time series.

~~One of the problems to be solved by the present invention is~~ In another aspect of this disclosure, there is provided an approach to provide an image to display a contrasted blood vessel which does not have uneven results caused by an error in imaging timings or imaging locations or a concentration of a contrast medium in the blood vessel without changing the conventional amount of a contrast medium, and to prevent any increase of an amount of X-ray to which a subject is exposed by starting the imaging all over again.

~~One of the problems to be solved by the present invention is~~ In another aspect of this disclosure, there is provided an approach, in extracting a certain region, to reduce the time required for operation, and to eliminate a variation in accuracy in extracting a region caused by individual differences between operators.

~~Means to Solve the Problems~~

~~The present invention relates to~~ In another aspect of this disclosure, there is provided a method, comprising: an inputting step of inputting an image data which is obtained by imaging a subject for a predetermined time with a medical imaging apparatus and is arranged in time series; an extracting along the time axis step of extracting pixels which satisfy a predetermined condition along the time axis from all the pixels arranged in time series for each pixel coordinate position, with respect to each pixel in the image data; and a constructing step of constructing a two-dimensional or three-dimensional image based on the pixels extracted along the time axis in the extracting along the time axis step.

Please amend the paragraphs at page 3, line 24 through page 9, line 19, in the following manner:

~~The present invention relates to~~ <u>In another aspect of this disclosure, there is provided</u> an image processing method, comprising: an inputting step of inputting an image data which is obtained by imaging a subject into which a contrast medium is injected for a predetermined period of time with a medical imaging apparatus and is arranged in time series; an image reconstructing step of reconstructing three-dimensional images arranged in time series based on the image data; an extracting along the time axis step, with respect to each pixel constituting the three-dimensional image arranged in time series, of extracting a maximum value pixel which has a clearest contrasted image by the contrast medium and a minimum value pixel which has little or no residual contrast medium therein from all the pixels arranged in time series for each pixel coordinate position along the time axis; a constructing step of constructing a two-dimensional or three-dimensional image which has a clearest contrasted image by the contrast medium based on the maximum value pixel and a two-dimensional or three-dimensional image which has little or no residual contrast medium therein based on the minimum value pixel; a difference operation step of performing a difference operation on the two-dimensional or three-dimensional image which has a clearest contrasted image by the contrast medium and the two-dimensional or three-dimensional image which has little or no residual contrast medium therein; and a difference image producing step of producing a difference image based on the result of the difference operation.

~~The present invention also relates to~~ <u>In another aspect of this disclosure, there is provided</u> an image processing method, comprising: an inputting step of inputting an image data which is obtained by imaging a subject for a predetermined time with a medical imaging apparatus and is arranged in time series; a filtering along the time axis step of performing a filtering process along the time axis on all the pixels arranged in time series for each pixel coordinate position and perform a

predetermined weighting process along the time axis in time series with respect to each pixel in the image data; and a constructing step of constructing a two-dimensional or three-dimensional image based on the image data on which the filtering process along the time axis was performed by the filtering step along the time axis.

~~The present invention also relates to~~ In another aspect of this disclosure, there is provided an image processing method, comprising: an inputting step of inputting an image data which is obtained by imaging a subject for a predetermined period of time with a medical imaging apparatus and is arranged in time series; a calculating step of calculating the amount of change between the pixel value of each pixel in the image data at a first time in the predetermined period of time and the pixel value of each pixel in the image data at a second time in the predetermined period of time; a calculating step of calculating an average value of the pixel values from the first time to the second time for each pixel coordinate position, with respect to each pixel in the region where the amount of change is a predetermined value or less; and a producing step of producing a processed image in which the pixel value of each pixel in the region where the amount of change is the predetermined value or less has the average value and the pixel value of each pixel in the region where the amount of change is more than the predetermined value has the pixel value of the image data.

~~The present invention also relates to~~ In another aspect of this disclosure, there is provided an image processing device, comprising: an inputting means which inputs an image data obtained by imaging a subject for a predetermined period of time with a medical imaging apparatus and is arranged in time series; an extracting along the time axis means which extracts pixels satisfying a predetermined condition along the time axis from all the pixels arranged in time series for each pixel coordinate position, with respect to each pixel in the image data; and a constructing means which constructs a two-dimensional or three-dimensional image based on the pixels extracted along the time axis by the extracting along the time axis means.

~~The present invention also relates to~~ In another aspect of this disclosure, there is provided an image processing device, comprising: an inputting means which inputs

an image data obtained by imaging a subject into which a contrast medium is injected for a predetermined period of time with a medical imaging apparatus and arranged in time series; an image reconstructing means which reconstructs three-dimensional images arranged in time series based on the image data; an extracting along the time axis means which extracts, with respect to each pixel constituting the three-dimensional image arranged in time series, a maximum value pixel which has a clearest contrasted image by the contrast medium and a minimum value pixel which has little or no residual contrast medium therein from all the pixels arranged in time series for each pixel coordinate position along the time axis; a constructing means which constructs a two-dimensional or three-dimensional image which has a clearest contrasted image by the contrast medium based on the maximum value pixel and a two-dimensional or three-dimensional image which has little or no residual contrast medium therein based on the minimum value pixel; a difference operation means which performs a difference operation on the two-dimensional or three-dimensional image which has a clearest contrasted image by the contrast medium and the two-dimensional or three-dimensional image which has little or no residual contrast medium therein; and a difference image producing means which produces a difference image based on the result of the difference operation.

~~The present invention also relates to~~ In another aspect of this disclosure, there is provided an image processing device, comprising: an inputting means which inputs an image data obtained by imaging a subject for a predetermined period of time with a medical imaging apparatus and is arranged in time series; a filtering along the time axis means which performs a filtering process along the time axis on all the pixels arranged in time series for each pixel coordinate position and perform a predetermined weighting along the time axis along the time series, with respect to each pixel in the image data; and a constructing means to construct a two-dimensional or three-dimensional image based on the image data on which the filtering process along the time axis was performed by the filtering step along the time axis means.

~~The present invention also relates to~~ In another aspect of this disclosure, there is provided an image processing device, comprising: an inputting means which inputs

an image data obtained by imaging a subject for a predetermined period of time with a medical imaging apparatus and is arranged in time series; a calculating means which calculates the amount of change between the pixel value of each pixel in the image data at a first time in the predetermined period of time and the pixel value of each pixel in the image data at a second time in the predetermined period of time; a calculating means which calculates an average value of the pixel values from the first time to the second time for each pixel coordinate position, with respect to each pixel in the region where the amount of change is a predetermined value or less; and a producing means which produces a processed image in which the pixel value of each pixel in the region where the amount of change is the predetermined value or less has the average value and the pixel value of each pixel in the region where the amount of change is more than the predetermined value has the pixel value of the image data.

~~The present invention also relates to a~~ <u>In another aspect of this disclosure, there is provided</u> computer aided detection comprising a medical imaging apparatus which obtains an image data arranged in time series by imaging a subject for a predetermined period of time, an operation device which constructs a two-dimensional or three-dimensional image based on the image data, and a displaying device which displays an image produced by the operation device, wherein the operation device comprises: an inputting means which inputs the image data arranged in time series; an extracting along the time axis means which extracts, with respect to each pixel in the image data, pixels satisfying a predetermined condition from all the pixels arranged in time series for each pixel coordinate position along the time axis; and a constructing means which constructs a two-dimensional or three-dimensional image based on the pixels extracted along the time axis by the extracting along the time axis means, and wherein the displaying device displays a two-dimensional or three-dimensional image constructed by the constructing means.

~~The present invention also relates to a~~ <u>In another aspect of this disclosure, there is provided</u> computer aided detection comprising: a medical imaging apparatus which obtains an image data arranged in time series by imaging a subject for a predetermined period of time; an operation device which constructs a two-

dimensional or three-dimensional image based on the image data; and a displaying device which displays an image produced by the operation device, wherein the operation device comprises: an inputting means which inputs the image data which is obtained by imaging a subject into which a contrast medium is injected for a predetermined period of time with a medical imaging apparatus and is arranged in time series; an image reconstructing means which reconstructs three-dimensional images arranged in time series based on the image data; an extracting along the time axis means which extracts, with respect to each pixel constituting the three-dimensional image arranged in time series, a maximum value pixel which has a clearest contrasted image by the contrast medium and a minimum value pixel which has little or no residual contrast medium therein from all the pixels arranged in time series for each pixel coordinate position along the time axis; a constructing means which constructs a two-dimensional or three-dimensional image which has a clearest contrasted image by the contrast medium based on the maximum value pixel and a two-dimensional or three-dimensional image which has little or no residual contrast medium therein based on the minimum value pixel; a difference operation means which performs a difference operation on the two-dimensional or three-dimensional image which has a clearest contrasted image by the contrast medium and the two-dimensional or three-dimensional image which has little or no residual contrast medium therein; and a difference image producing means which produces a difference image based on the result of the difference operation, and wherein the displaying device displays the difference image produced by the difference image producing means.

~~The present invention also relates to a~~ In another aspect of this disclosure, there is provided computer aided detection comprising: a medical imaging apparatus which obtains an image data arranged in time series by imaging a subject for a predetermined period of time; an operation device which constructs a two-dimensional or three-dimensional image based on the image data; and a displaying device which displays an image produced by the operation device, wherein the operation device comprises: an inputting means which inputs the image data arranged

in time series; a filtering along the time axis means which performs, with respect to each pixel in the image data, a filtering process to all the pixels arranged in time series for each pixel coordinate position along the time axis and perform a predetermined weighting along the time axis along the time series; and a constructing means which constructs a two-dimensional or three-dimensional image based on the image data on which the filtering process along the time axis was performed by the filtering along the time axis means, and wherein the displaying device displays the two-dimensional or three-dimensional image constructed by the constructing means.

~~The present invention also relates to~~ In another aspect of this disclosure, there is provided a method for filtering along the time axis, comprising: an inputting step of inputting an image data which is obtained by imaging a subject for a predetermined period of time with a medical imaging apparatus and is arranged in time series; and a filtering along the time axis step of performing, with respect to each pixel in the image data, a filtering process on all the pixels arranged in time series for each pixel coordinate position along the time axis and perform a predetermined weighting along the time axis along the time series.

~~The present invention also relates to~~ In another aspect of this disclosure, there is provided a method for filtering along the time axis, comprising: an inputting step of inputting an image data which is obtained by imaging a subject for a predetermined period of time with a medical imaging apparatus and is arranged in time series; and a filtering along the time axis step of performing, with respect to each pixel in the image data, a filtering process to all the pixels arranged in time series for each pixel coordinate position along the time axis and obtain a pixel value which represents each pixel coordinate position.

~~According to the present invention~~ Accordingly, a site where a contrast medium preferably exists can be extracted from the image data taken along the time series along the time axis so that the images of the sites are synthesized to create a wide and clear image of the path through which the contrast medium passed. Thus, the angiographic images can be improved to be clearer and wider while reducing the influence of a contrasting effect which changes with time transition in imaging and

keeping the reduced amount of the contrast medium to use.

~~Also according to the present invention~~ Further, in order to reduce a fluctuation in a pixel value along the time series, a change of a pixel value in a two-dimensional or three-dimensional image is processed along the time axis to obtain a filter function along the time axis. Application of the filter function along the time axis to the region of an image where the pixel value does not substantially change along the time series reduces the influence of noise without lowering concentration resolution and space resolution.

~~Also according to the present invention~~ In addition, only a region where a contrast medium exists can be extracted by means of the difference between an image which is contrasted most by the contrast medium and an image where the contrast medium does not exist among the two-dimensional or three-dimensional images along the time series. Thus, when a certain organ surrounded by other organs should be extracted, a desired region can be accurately extracted in a short operating time by a simple process without any variations in extraction accuracy of a region caused by the differences in individual abilities among operators. A display of a contrasted image can be provided which does not have uneven results caused by an error in imaging timings or imaging locations or the concentration value of a contrast medium without changing the conventional amount of a contrast medium, and any increase of an amount of X-ray to which a subject is exposed by starting the imaging all over again and any increase of cost can be prevented.

~~Also according to the present invention~~ Further, the filter function along the time axis makes it easier to know the state of a dynamic region by displaying an image of the dynamic region with colors while reducing the amount of noise. Thus, an image processing technique which makes the evaluation of function information underlying the dynamic region easier can be provided.